

Government General Degree College, Dantan-II

5th Semester B. Sc (H) Internal Examination-2021

Subject: Chemistry

Paper: DSE-1T

F.M: 20

Time: 1h

Answer the following questions (*any five*)

5×4

1. State and explain Nernst heat theorem. Mention its limitation.
2. Define thermodynamic probability. Derive a relation between entropy and thermodynamic probability.
3. What is ensemble? Define different kind ensemble. Derive 3rd law of thermodynamics.
4. What is residual entropy? Explain the origin of residual entropy for carbon monoxide, water and hydrogen.
5. Write Plank and Lewis-Randal statement of 3rd law of thermodynamics. Use the law to determine the absolute value of entropy of a substance at a temperature (T) above its boiling point.
6. What is partition function? Derive expression for internal energy and entropy in terms of partition function.
7. Derive Boltzmann distribution law, when energy levels are non-degenerate.
8. (a) Find the total number of complexions in arranging four distinguishable systems among energy levels $0, 1\varepsilon, 2\varepsilon, 3\varepsilon$ such that total energy is 3ε . (b) Calculate the possible number of arrangements of four distinguishable particles such that two are in the first compartment, none in the second, one each in the 3rd and 4th compartment. Assume that each compartment is divided into two equal size boxes.
9. Derive Einstein equation for heat capacity of solid from partition function.
10. (a) Is it possible to approach to Zero Kelvin temperature? (b) What is Gibbs paradox?